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This Month

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Vol. 35, No. 1 Bartow, Florida January, 1954

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Citrus Insect Control For January, 1954

W. L. THOMPSON, R. M. PRATT, AND R. B. JOHNSON
FLORIDA CITRUS EXPERIMENT STATION
LAKE ALFRED

W. L. Thompson

Purple scale infestations decreased during December and from all indications, there will not be any marked increase in January. There are only a few groves that have a medium to heavy infestation and some of these may need treatment to prevent fruit drop if dry weather develops.

Red scale activity has been decreasing and there are no indications that it will be a problem this winter except in a few individual groves. During late January there may be a slight increase.

Purple mite infestations have been below the average for this time of the year. If wet weather continues, the activity during January will likely be below normal. Even though the infestations are now at a fairly low level, a period of dry warm weather in January could change the picture.

Rust mite activity has decreased during the past month. It is quite possible that the average infestation will remain at a fairly low level during January.

Six-spotted mites are being found in a few groves and there is a possibility that some infestation may develop next spring.

Spray Program

Trees have a minimum number of leaves in January, so it is a good time to grade them for severity of scale infestation as well as to inspect for other insects and mites. A good idea of the type of dormant and post-bloom spray program needed can be obtained by checking the groves at this time. The important insects and mites to keep in mind while inspecting trees are purple scale on leaves, wood, and fruit; red scale on leaves and fruit; mealybugs under the calyx of the fruit and on trunk and limbs; six-spotted mites on the under-surface of mature leaves and on rough lemon sprouts; and rust and purple mites on leaves and twigs, especially on tree tops.

A few groves may need scale control before the flush of growth. It is especially important to control heavy infestations of red scale before the spring flush because crawlers settle on young foliage and destort it. When applying a miticide for purple mite control, make a thorough application. Thoroughly wet the under-surfaces of the leaves to kill any six-spotted mites that may be present. Six-spotted mite infestations seldom develop in the spring groves that have received a January application of an effective miticide. During January, or before any growth starts, a dormant copper spray should be applied where scab is a problem in Temple and grapefruit groves in the coastal areas. Nutritional sprays containing borax and compounds of zinc, manganese, and molybdenum may be included in the dormant spray. Most of the insecticides are compatible with the nutritional elements. Parathion, DN compounds, and the several brands of Aramite should not be used in solutions that have a pH. over 7.5, but Ovotran brands can be used in solutions having a higher pH.

Scale Control: Where it is necessary to control scale, an application of 1-2/3 pounds of 15% parathion should be used. Sulfur, miticides, and nutritional element can be combined with parathion. If an oil emulsion is to be used, the application should be made in late January or as late as possible before the growth starts, so there will be less chance of damage from cold weather. Any of the neutral coppers can be combined with an oil emulsion but care should be taken to prevent floculation. An oil spray should not be used on Valencias if the fruit has not fully colored.

Mealybug Control: January applications of parathion at 1-2/3 pounds of 15% material per 100 gallons have been very effective in controlling mealybug. Sprays at this time prevent infestations on the new crop in the spring. Thorough coverage, however, of limbs and tree trunks is necessary for satisfactory control.

Mite Control: Purple mite infestations may cause a heavy leaf drop and all infested groves should be treated. By controlling the infestations in January, the early spring growth will also be protected. Effective miticides include 1-2/3 pounds of DN Dry Mix or 1 pound of one of the Ovotran brands or 2 pounds of one of the Aramite brands per 100 gallons. A 1½ percent DN-sulfur dust can also be used, but it is not so effective as a good spray. The longest periods of control with any miticide are obtained when applications are made before heavy infestations develop.

Six-spotted mites can be controlled with any of the miticides used for the control of purple mites, but thorough coverage of the under-surfaces of the leaves is necessary.

Rust mite control is as necessary in groves where the fruit has been picked as in groves where the crop is still on the trees. Heavy infestations on leaves and fruit can cause a heavy leaf drop. If infestations are reduced to a very low level in January or early February, there is not so much chance of early rust mite injury from a heavy infestation in the spring. For rust mite control alone, a combination of 1 gallon of lime-sulfur plus 5 pounds of wettable sulfur per 100 gallons is very effective. Wettable sulfur, 5 to 10 pounds per 100 gallons, is the most common form of sulfur used because it may be combined with parathion and the various miticides.

More thorough coverage of foliage with a minimum number of gallons can be obtained at this time because there are fewer leaves on the trees than at any other time of the year.

For detailed information on all sprays refer to the 1953 "Better Fruit Program" where all necessary materials are listed under Formula 1. For information not included in the Spray Schedule, consult the Citrus Experiment Station at Lake Alfred or the Indian River Field Laboratory at Fort Pierce.

A hunting license does not entitle the holder to trespass on private land.

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* Written December 23, 1953. Reports of surveys by Harold Holtsberg, Cocoa, J. W. Davis, Tavares; K. G. Townsend, Tampa; J. B. Weeks, Avon Park; and T. B. Hallam, Lake Alfred.

West Coast Citrus School Opens In Tampa Jan. 5

The West Coast Citrus School for growers and others interested in citrus will begin in Tampa on January 5 and continue through April 20, 1954, according to an announcement by Alec White, Hillsborough County Agent, and Fred P. Lawrence, citricultrist with the University of Florida Agricultural Extension Service.

"The Economics of Citrus Production and Management" will be the major theme of the school, with lectures discussing citrus soils, fertilizers, nutrient sprays, pest control, diseases, varieties and rootstocks, and other phases of production in relation to costs.

Sessions of the school will be held from 7:30 to 9:30 P. M. every Tuesday, beginning January 5 and ending April 20, in the agricultural auditorium of the new Hillsborough court house.

Lecturers from the school will include staff members of the College of Agriculture, Extension Service, and Citrus Experiment Station of the University of Florida, the U. S. Department of Agriculture, and the State Plant Board.

Enrollment will be limited to 200 students, and growers and others who are interested should register as soon as possible. Registration blanks may be obtained from Alec White, Hillsborough County Court House, Tampa, Florida, or Charles Leo, Greater Tampa Chamber of Commerce, Tampa, Florida. The registration fee is $7.50. Students will receive copies of all lectures, and those who attended regularly will be given a certificate of attendance at the end of the school.

Sponsors of the West Coast Citrus School include Greated Tampa Chamber of Commerce, Flag Sulphur & Chemical Co., Gulf Fertilizer Co., Lyons Fertilizer Co., Niagara Chemical Co., Food Machinery Corp., Penisular Fertilizer Works, Orange State Motor Co., Stauffer Chemical Co., West Coast Fertilizer Co., Dan Wilbanks Farm Supply Corp., and U. S. Phosphoric Products Corp.

Even though prices that farmers receive for their products may not be quite as high as they were in 1953, the average Florida farm family should fare almost as well during the next 12 months as it did during the past year, is the belief of Charles M. Hampton of the University of Florida Agricultural Extension Service.

and what's more I've never used any fertilizer other than Gulf on my grove. Gulf Fertilizers help me get finest yields of top quality citrus. This has kept my cost per box low and brought best returns over the years." —F. M. Hahs, Lutz, Florida

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Observations On Citrus Blight . . .

J. F. L. CHILDS (1)

Introduction

Blight is among the oldest described citrus diseases in Florida being antedated only by foot rot, a fungus (**Phytophthora** sp.) disease, and exanthema (copper deficiency). It has also been called orange blight, limb blight, go-back, wilt, dry wilt, leaf wilt, leaf curl, roadside decline, root-rot, and Plant City disease. According to Rhoads (4) Manville alluded to blight in 1883, but older settlers doubtless knew of the disease for a number of years before that. In 1891 Underwood (9) was sent to Florida by the U. S. Department of Agriculture to make a preliminary study of citrus diseases, and the following year Swingle and Webber (8) were sent to work on citrus diseases, especially blight in Florida. After their report was published in 1896 very little further work was done until Rhoads (4) took up the problem in 1923.

Economic Importance

Underwood (9) considered blight "the most dangerous disease that has yet appeared among the orange groves" and urged an immediate study to determine its cause and cure. Swingle and Webber (8) noted that in some localities 1 to 10 percent of the trees were annually stricken with blight. They estimated the annual loss to be about $150,000. According to Fawcett (1), the loss from blight in 1909 was probably in excess of that figure.

J. F. L. CHILDS

Between 1910 and the present time, a great change occurred in the Florida citrus industry which caused blight to be largely obscured. Thousands of acres of new land were planted with the new rough lemon (**citrus limon**) rootstock, with the result that citrus production was approximately doubled every 10 years between 1910 and 1950. These newer plantings increased at such a rate and dominated the citrus picture to such an extent that blight seemed to decrease, and in 1918 Stevens (6) reported that blight was much less important than formerly. However, the number of trees attacked annually by blight did not decrease at any time.

In time blight began to show up in the newer rough lemon rooted plantings as the trees matured and became susceptible. To many growers it was a new disease which they sometimes called root rot. In 1947 Suit and DeCharme (7) reported that root rot (blight) was the second most frequently encountered disease (20 percent) in their survey of 204 sick groves. Foot rot was first (27 percent) and spreading decline was third (13 percent). Seven other causes of decline, ranging from water damage to drought injury were listed. Thus a large portion of the declining trees so common in older groves are affected with blight.

Figures compiled by caretakers of approximately 5,000 acres of citrus dispersed over several counties in the central part of the state reveal that more than one percent of the bearing trees are lost annually from all causes. If one-fifth of the total annual loss can be ascribed to blight, then on the basis of 28.2 million bearing trees in Florida (1951 estimate) (5) and $24.60 per tree (65 trees per acre having

(1) Plant Pathologist, U. S. Horticultural Station, Orlando, Fla., at Meeting of the Florida State Horticultural Society.

an average estimated value of $1,800 less land value of $200) the present annual loss from that disease is in the neighborhood of $1,400,000 or roughly ten times as great as the 1896 figure. This estimate is on the conservative side because it is based solely on the value of trees replaced each year and takes no account of production lost because of blight prior to the time of replacement or the cost of replacement.

Distribution

Blight was thought to be confined to Florida by Swingle and Webber (8) and later by Rhoads (4). Fawcett (1) stated that blight did not occur in California in 1915, and there is no record of its appearance there since that time. According to Rhoads (4), P. H. Rolfs did not see it during his 13 years in Brazil. However, Mortensen (2) described a citrus disease occuring near Winter Haven, Texas, that is strikingly similar to blight, a fact which he was first to point out. Also, in Pakistan there is a die-back of citrus trees that corresponds to blight according to A. J. Pirzada,* government horticulturist of Sind, Pakistan.

Symptoms

Blight rarely attacks trees before they are 10 to 15 years old. Florida authors agree on this point. Traveling from tree to tree in a hit or miss fashion blight spreads in all directions, sometimes rapidly and at other times rather slowly. All the trees in the affected area are not attacked at once; some may remain healthy for years in close proximity to diseased trees.

Affected trees never recover even temporarily. If the branch ends are cut back no new growth is stimulated, but sprouts may grow out from the trunk and lower branches. None of the blighted trees ever survived that were transplanted to new soil from time to time. Affected trees occasionally die quickly but more often they linger for years in a partially defoliated, unproductive condition.

The symptoms of blight were described by Swingle and Webber (8) in 1896 as follows: "The first symptom is a wilting of the foliage as if the tree were suffering from drought. At first the wilting is slight and can be plainly seen only on hot dry days. However, it soon becomes very pronounced and often continues so during the wet season in summer when rains are almost a daily occurrence. - - - After wilting becomes severe the foliage begins to drop and in a few weeks or months, according to the severity of the case, the affected branches shed nearly all their leaves. This is followed by slow dying-back of the branches. In many cases the whole top of the tree is attacked at one time but very often only a single branch shows the disease at first. In such cases, however, the entire tree soon becomes affected.

"As soon as the rainy season begins, the trunk and large branches put forth numerous water spouts (Fig. 1, A), which grow rapidly and at first seem to be perfectly healthy. (The production of water spouts is more marked on sweet orange (**citrus sinens**) than on grapefruit (**C. paradisi**) trees. This habit of producing abundant sprouts distinguishes blighted trees from those affected with spreading decline, a different disease.) Eventually even the spouts sicken and die-back.

"A most remarkable fact is that the roots of blighted trees invariably seem to be entirely healthy." This last statement is substantially true but occasionally a few roots are found black and necrotic (Fig. 1,B), usually towards the distal end. This condition is probably responsible for the name root rot, which is sometimes applied to this disease.

There is one important aspect of blight not discussed by previous authors, and that is minor element deficiency symptoms. Blighted trees frequently show symptoms of zinc and manganese deficiency on the water sprout foliage and occasionally show boron deficiency symptoms in the albedo of the fruit under conditions where the availability of these minor elements is entirely edequate. Such deficiency symptoms do not respond to soil application of the appropriate minor elements. In short, trees affected with blight seem unable to absorb or to translocate water and nutrients even when adequate amounts of both are available.

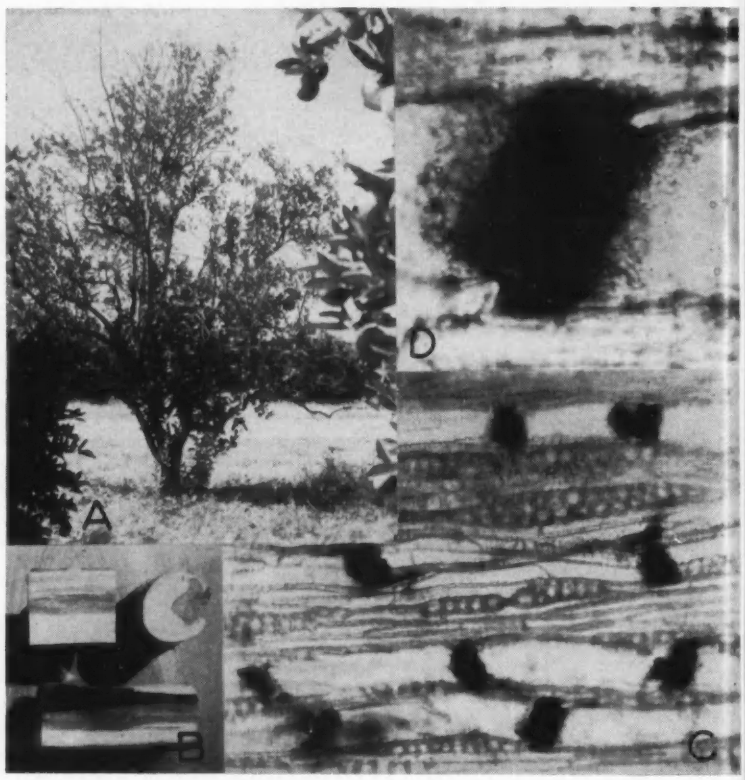

Fig. 1. A—Blight, affected sweet orange (C. sinesis) on Rough lemon (C. limon) stock; B—sections of necrotic roots, the root rot aspect of blight; C—Longitudinal sections of a Rough lemon root showing plugging of vessels, x200; D—vessel plug, showing strands or fibers, x800.

Species and Varieties subject to blight: Few figures are available on the comparative susceptibility of citrus varieties because other factors such as soil type, drainage, rootstock, etc. are seldom comparable. There is a tendency to regard as most susceptible varieties that are most widely planted and hence often seen in blighted condition. Swingle and Webber (8) and Rhoads (4) regarded sweet orange trees as considerably more susceptible than grapefruit. The latter author regarded Pineapple orange trees as more susceptible than Valencia or seedling sweet orange. Tangerines

* In conversation at the time of his visit to Florida, April, 1953.

(C. reticulata) seem to be attacked less often than grapefruit. The present scarcity of sour lemon (C. limon) trees in Florida makes it difficult to Judge the susceptibility of that species, although Swingle and Webber (8) rated lemon trees more resistant than sweet orange or grapefruit. Today there are probably more blighted trees on rough lemon stock than on any other merely because citrus is grown on it. Swingle and Webber (8) considered limes, presumably seedling Mexican limes (C. aurantifolia), and seedling sour orange trees (C. aurantium) to be almost free from blight. They further remarked that "Curiously enough the sort of stock used appears to have no influence in increasing or diminishing the susceptibility of trees to the disease." That characteristic of blight has been observed recently in a grove of 50-year-old grapefruit trees on mixed rootstocks (sour orange, rough lemon, and cleopatra mandarin, C. reticulata). There was no observable difference in the rate with which the trees on the three rootstocks succumbed to the disease.

Mortensen (3) studying a disease with symptoms similar to blight at Winter Haven, Texas, found that of 16 rootstocks on trial (trees, 10 years old or older) 13 were susceptible, but trees on three other stocks, Changsha tangerine, Rustic Citrange, and Kansu (Ichang) lemon expressed no symptoms (table 1). It is difficult to tell whether these three rootstocks are indeed resistant or merely have excaped the disease to date.

Influence of location: According to Swingle and Webber (8) blight attacks citrus trees on all kinds of soil and is most prevalent on the best citrus lands. As a result it is obviously impractical to prevent the disease by planting on lands least subject to it. Trees on shallow, poorly drained soils are also subject to blight, but the diagnosis is often confused by damage from poor drainage. None of the previous authors mentioned the relation of soil pH to the incidence of blight. In preliminary tests by the author, soil samples down to the 30 inch level have not indicated any relation betwen soil pH and rate of spread within a grove of 50 year old grapefruit trees. There seems to be some relationship between blight and proximity to highways, the nature of which is not clear. Blight is quite obviously not related to leaching from lime rock road-beds because there are many affected trees not adjacent to roads and some next to roads are on banks never reached by water from the road.

Cause of Blight

There have been many theories as to the cause of blight and most authors have thought blight to be contagious. Underwood (9) considered a bacterial organism to be the most probable cause. Swingle and Webber (8) hazarded no guess as to its cause but stated emphatically that it could not be attributed directly to cold, drought, wet weather, close proximity to hard pan or improper fertilizers as was often erroneously believed. Rhoads (4), however, thought blight to be related to soil moisture deficits and excesses brought on by one or a combination of causes.

TABLE 1.
Susceptibility of 16 varieties of citrus to "decline" at Winter Haven, Texas, 1951. (3).

Rootstock	Declined trees	Healthy trees	Percent with decline
Calamondin	4	7	36
Citrange, Carrizo	8	17	31
Citrange, Cunningham	17	57	23
Citrange, Morton	7	9	44
Citrange, Rusk	4	37	10
Citrange, Rustic	0	11	0
Citrange, Savage	16	24	40
Citrange, Uvalde	5	21	19
Citrangedin	5	3	63
Citrangequat, Thomasville	1(?)	10	9(?)
Citrumelo, Sacaton	6	25	19
Kansu (Ichang)‡	0	5	0
Lemon, Meyer	5	1	83
Sour orange	2	17	11
Tangerine, Changsha	0	3	0
Trifoliate orange	137*	119	54

? Diagnosis uncertain.
* Trees affected with exocorits were included in this figure.
‡ Ichang lemon according to Mortensen.

The deterioration of blight affected trees is sometimes thought to result from the black and necrotic roots occasionally found on such trees. Necrosis seldom affects more than one or two roots on a tree and often affects only one side of a root (Fig. 1, B) in a strip several feet in length. It seems to start most often near the far end of the root and to progress toward the root crown. However, this type of root damage is of such sporadic occurrences and minor intensity that it seems scarcely able to account for the death of large trees.

Three genera of fungi (**Diplodia, Fusarium,** and **Phoma**) can regularly be cultured from necrotic roots. Repeated attempts were made to cause wilting by inoculating rough lemon seedlings with cultures of these fungi isolated from necrotic roots. One year old seedlings, five per pot, were transferred to 5 gallon crocks filled with sharp sand. Four series of crocks were set up and two were watered with half-strength and two with one-tenth-strength Hoagland's solution by a drip method. Nutrient solutions were adjusted to pH 4.5 for one member of each pair and at pH 6.0 for the other member. Wilt symptoms were occasionally produced in the inoculated pots and once in the checks, but only when stunted field grown seedlings of low vigor were used. This seems to indicate that root necrosis (rot) resulted when roots already weakened from other causes were attacked by weak parasites of citrus such as **Diplodia** sp. and **Fusarium** sp.

It is well known that water and dissolved nutrients are translocated from roots to the leaves by a system of tubes or vessels in the wood or xylem. These are made up of short sections or vessel elements joined end to end very much like drain tile, but with a constriction at each junction. Microscopic examination of sections cut from the roots of blighted trees reveals that the vessels are plugged by material (Fig. 1, C) of undetermined nature that collects at the constrictions. These plugs could retard or stop the flow of water and nutrients through the vessels. A species of actinomycetes (a group of organisms intermediate between fungi and bacteria) of the nocardia type has been isolated from such roots on several occasions. As yet it has not been established that the formation of plugs is related to a micro-organism although at times the plugs resemble masses of actinomycte hyphae (Fig. 1, D). Similar vessel plugging, often accompanied by brown staining of the wood, was found in the twigs of blighted trees and could account for the twig die-back which is conspicious.

Treatment

After 62 years we still know very little about blight. We do not know what causes it, how to control it, or how to avoid it. However, experience has shown that blighted trees never recover and efforts in that direction appear to be futile. Thus it is suggested that blighted trees be removed as soon as the identity of the disorder is reasonably certain.

There seems to be no harm in replanting immediately. Young trees grow normally even when set out the same day the blighted trees were removed. Under such conditions blight symptoms rarely appear before the replant is 15 years old.

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The Necessity For Quality Fruit In The Terminal Markets

And Its Advantage To The Dealer Service Department And Florida Grower

CHARLES J. KOECHLING, JR.
EASTERN DIVISION MANAGER
NEW YORK, N. Y.

PRESENTED AT THE
SIXTY-SIXTH MEETING
FLORIDA STATE HORTICULTURAL
SOCIETY - NOVEMBER 3-5, 1953

You may be surprised to hear that many fruits fall into what is considered the luxury class. Futhermore, that a large share of them are bought on eye appeal. Let's not attempt at this time to go into the question of whether or not citrus fruits should be considered luxury items. However, I firmly believe, and I hope you agree, that attractiveness is always important. When we speak of attractiveness we, of course, mean quality. And when we say citrus quality, we also mean quality internal and external. Our citrus fruits are not in a class with the Atlantic City bathing beauties who compete but once a year. We're contending for honors practically every day in the season. We would indeed be short-sighted if we did not realize that fact and its importance. Today with the competition increasing on fresh citrus fruits in terminal markets, it becomes apparent immediately that quality fruit is the only kind that can be expected to hold its own. Likewise, it is the only kind which will prove profitable to both shipper and grower.

There is no doubt that a substantial percentage of the consuming public insists upon fresh fruit. A certain percentage always will. What that percentage will be depends on the growers and shippers of Florida. I'm certain everyone here would prefer to avoid a situation in which fresh fruits would play an insignificant part in our great industry. I am also certain that you don't have to be convinced that such a condition would prove calamitous to the Florida growers. So, it's best to be practical and realistic. Frankly, all concerned, and especially the Florida citrus grower will benefit from the careful selection and, shipment of only good quality fresh fruit into terminal markets. It's obvious why this is advisable, even, necessary.

New York, the largest terminal and handler of Florida citrus, demands consistently high quality. Careful checking of prices is positive proof of this as top labels, known for quality, always bring consistently high prices. At times the difference might only be a few cents but the spread can and does go as high as dollars. The overall price structure for the season offers greater rewards to those shipping consistently good quality fruit.

The New York market is made up of approximately 400 buyers and brokers who have been in this business most of their lives. Therefore, these men are experts when it comes to recognizing quality Florida citrus. Quality in the terminal markets is dependent on the following: (1) attractiveness (2) internal quality (3) proper grading (4) proper sizing and (5) weight.

Attractiveness Essential

Let's examine each one of these. For example attractiveness. That means freshness, external color, smooth texture and high sheen. Internal quality is juice content, good color and taste. Proper grading assures uniformity of quality at least external. Proper sizing is necessary for uniformity of the pack, while the normal juice content makes for a good heavy pack.

Brand names, or labels that have made a place for themsselves in the terminal markets have acquired their reputation on the basis of these factors and buyers will continuously seek them on their name alone. In auction markets, buyers looking for these outstanding brands will increase the competitive bidding which is mainly responsible for top prices. Although these brands constantly hold their own, lower quality fruit definitely lowers market prices. It is a known fact that terminal market prices build up when quality citrus makes up the largest portion of daily offerings but when prices reach a high level, there is an increase of shipments of lower quality fruit to take advantage of favorable prices. This literally means a race to market with lower quality citrus and continues until low prices prevail which are unprofitable to shippers and growers. Even at this point, quality fruit still brings higher prices, but after such a situation, the market takes weeks to get back on its feet. And once again quality, plus the operation of the law of supply and demand, is responsible for bringing market prices back up.

Quality Controls Retail Level

Quality plays a most important part at the retail level where the housewife is the major factor in judging fruit. Mrs. Consumer is more conscious of quality on fresh produce than on other items she purchases. This is proven by the growing number of independent produce retail stores. These small independents are doing a thriving business right next door to large chains some of which are overlooking the importance of eye-appealing displays of quality fruit. Chains sometimes are overly price conscious and perhaps fail in some cases to realize that Mrs. Consumer will spend a few cents extra for quality citrus. This factor is apparent as the independent fruit store dealer continues to "shine his apples", using individual wrappers and colored tissues to decorate his citrus displays, topping them off with cut fruit. Although not all chain organizations are guilty of poor handling of citrus, a large number are negligent after the fruit reaches their retain outlets. At this level, inexperienced help, not enough help, and generally unattractive displays are the major factors hampering sales. However, chains are definitely becoming more and more conscious of this fact and during the past year or so, there has been a gradual improvement. More experienced and better trained clerks are being obtained as chains realize the excellent profits which can be obtained from a properly operated produce department.

Since citrus is a highly profitable but perishable commodity, it requires fast turn-over. This can be obtained only by attracting Mrs. Consumer's dollar. Citrus is an item that the housewife often buys on impulse, making her selection from attractive displays of fresh high quality fruit. If the quality of our fruit is high and our displays attractive, she will make

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A Preliminary Report on the Requirements of Young Valencia Trees

For Zinc, Manganese and Copper When Fertilized At Two Different Rates*

J. T. GRIFFITHS
AND
J. K. ENZOR, JR.
LYONS FERTILIZER CO.
WINTER HAVEN

In the spring of 1949, a small block of newly set Valencia trees near Lake Placid was made available for experimental work.** The trees were on rough lemon root stock and were planted on sandy soil typical of the Lakewood series encountered at Lake Placid. After being set out in the grove, they were not sprayed or fertilized prior to the inauguration of the experiment reported here.

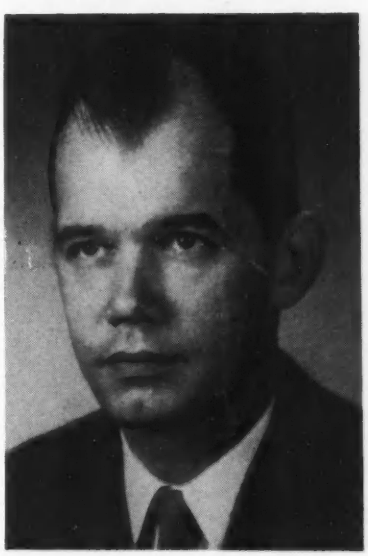
The experiment was designed to study the zinc, manganese, and copper requirements of young citrus trees. Originally, neutral materials were compared with the sulfates, but this aspect of the experiment was discontinued in 1952. Each of these metals was tested at 0, 1 and 3 pounds of the sulfate per 100 gallons of spray, or at the equivalent metallic content if neutral materials were used.

Since all these rates for the three materials were to be tested, there were 27 different treatments. Single trees were used for each treatment so that, within a plot, each of the 27 trees had a different treatment. There were 216 trees in the experiment with the zinc-manganese-copper treatments replicated eight times. The trees were sprayed with sulfur, oil, and DN as needed.

Although fertilizer formulae have differed from time to time, they have averaged about an 8-4-8-5 throughout the 4½ years. Originally, half of the experiment received twice as much fertilizer as the other half. In 1951, this was changed so that the high level was about half again as much as the lower level. Table 1 shows the pounds of nitrogen applied per tree in each of the first five years.

Since 1949, seven copper, zinc, or manganese sprays have been applied (June, Oct., 1949; Jan., May, 1950; Apr., 1951; May, 1952; and May, 1953). The trees are now so large that they will be too close together for sprays to be used another year. It is planned to start soil treatments in 1954.

A total of approximately 10 gallons of spray has been applied per tree during the five spray seasons. This represents 1/10 of a pound of zinc, manganese, or copper sulfate per tree at 1 lb./100 gals. and 0.3 lb. at 3 lbs. per 100 gallons. Approximately half of this total amount was applied in 1953. Zinc, manganese, and copper have not been supplied in the fertilizer.



J. T. GRIFFITHS

Results and Discussion

Results are still preliminary. Until yield rates have been established, it will be impossible to fully evaluate the experiment. However, growth characteristics and deficiency symptoms suggest some tentative conclusions.

TRUNK DIAMETER: The rate of growth is a primary consideration when studying the necessity for a nutritional program. In this experiment growth was measured by determining the diameter of each tree at a point just above the bud union. This area was marked with a painted white band. These were first measured after the trees were set and similar determinations have been made in the spring of each suceeding year. Table 2 presents these data.

Table I

Pounds of Nitrogen Applied Per Year Per Tree.

	FERTILIZER LEVEL	
Year	High	Low
1949	.14	.07
1950	.80	.40
1951	.72	.47
1952	1.32	.88
1953	1.91	1.31

The major effect on diameter has resulted from the amount of fertilizer applied. Regardless of initial size, by 1951, in all of the comparisons shown in Table 2, the greater diameter was always found on the high fertilizer level. The magnitude of this difference appears to be increasing with each year.

Neither zinc nor manganese have had any effect on trunk diameter through the first four growing years. In the case of copper, there is a tendency toward increased size with increasing amounts of copper. This is somewhat questionable because of the variation within the copper treatments.

YIELD: Sufficient fruit was set in 1952 and 1953 to give preliminary information on yields. Individual fruits were counted on each tree in March 1953. (See Table 3). The 1953-54 crop was counted in October 1953. (See Table 4). Zinc and manganese had no effect on the number of fruits per tree. In the case of copper, there appears to be a reduction in the number of fruits produced on the no copper

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* Presented at the Florida State Horticultural Society at Daytona Beach.

** Without the cooperation of Lykes Brothers Groves this work would have been impossible. The authors particularly wish to express their deep appreciation for the sincere help of Mr. Robert C. Wooten. His generosity and cooperation permitted this project to be set up and to be operated with the burden of the expense donated by Lykes Brothers Groves. This experiment was started while the senior author was employed by the Citrus Experiment Station.

treatment as compared with 1 or 3 pounds per 100 gallons. This was true on both the high and low levels of fertilization for both years.

Fertilizer rate had an influence on the number of fruit. This was true with all treatments. There was a much greater percentile difference in the 1952-53 crop than the 1953-54 one. It is possible that increased yields will completely justify the increased rate of fertilization, but this is not obvious yet. If fertilizer is figured at 2½ cents per pound, it has cost approximately 93 cents per tree for fertilizer for the low level, and 149 cents for the high level for first five years. During this same period the trees on the low rate have produced an average of 94 oranges as compared with 118 on the high level.

Table 2

Diameter of Trees in mm. as affected by Fertilizer Level and Zn, Mn, or Cu.*

		Pounds of Sulfate per 100 gallons								
		0			1			3		
	Year	Fert. Level			Fert.	Level		Fert.	Level	
		High	Low	Avg.	High	Low	Avg.	High	Low	Avg.
Zinc	1949	26	27	27	25	26	26	25	26	26
	1950	32	33	33	33	32	33	32	32	32
	1951	58	57	58	56	54	55	55	54	55
	1952	85	83	84	83	80	82	85	80	83
	1953	118	117	118	117	112	115	119	111	115
Manganese	1949	25	26	26	25	26	26	26	26	26
	1950	32	32	32	32	32	32	34	31	33
	1951	56	55	56	56	54	55	58	55	57
	1952	86	81	84	84	79	82	85	82	84
	1953	117	114	116	118	112	115	117	115	116
Copper	1949	26	26	26	26	26	26	25	27	26
	1950	33	32	33	33	32	33	33	32	33
	1951	55	54	55	58	57	58	59	55	57
	1952	85	79	82	83	81	82	86	83	85
	1953	118	112	115	117	115	116	119	116	118

* Each figure represents an average of 36 trees.

METAL DEFICIENCY SYMPTOMS: Periodically the trees have been examined for symptoms of zinc, manganese, and copper deficiency. Typical symptoms for all three of these materials have been noted. However, on several occasions symptoms typical of a given deficiency have not been correlated with the rates of application of the metal. This fact has caused considerable confusion in an attempt to evaluate the leaf symptoms as they have been noted. In the discussion below typical deficiency symptoms are listed and evaluated. At the same time, a discussion of symptoms which cannot be cataloged is made, and information other than data collected in this experiment is also included. This latter discussion may offer a partial explanation for similar situations which arise in commercial grove practice.

Copper Deficiency: No symptoms of copper deficiency were noted until the fall of 1952. Prior to that time, neither multiple growth nor split fruit had shown any relation to copper usage. Ammoniated fruit was first seen in Novmber 1952, when symptoms were noted on 15 trees, of which 13 were on the high level of fertilization. The ammoniation on one tree on the low fertilizer level was questionable, and it had received copper at 1 pound per 100 gallons. All others were on the 0 copper level. In October 1953, ammoniation was beginning to be evident on the fruit, but it was still too soon to analyze the final extent of this condition. As this is written no die-back has been evidenced in the plots, split fruit has not been correlated with lack of copper, and neither multiple nor S-shaped growth has been associated specifically with low copper. There has been a reduction in yield on the zero copper plots.

Table 3

Number of Fruit Per Tree When Counted In the Spring of 1953.*

Lbs. S04/100 Gal.	ZINC 0	1	3	MANGANESE 0	1	3	COPPER 0	1	3	Average
Low Level of Fertilizer	53	32	34	43	44	32	37	39	43	
	55	40	56	43	60	49	34	59	58	
	42	63	43	63	32	53	53	55	40	
	35	45	55	43	51	40	31	43	60	
Average	46	45	47	48	46	43	39	49	50	46
High Level of Fertilizer	62	67	55	64	41	80	58	63	64	
	69	91	76	65	81	91	75	89	72	
	64	65	61	80	58	53	49	56	87	
	65	87	60	72	63	77	62	93	57	
Average	65	78	63	70	61	75	61	75	70	69
Average of 2 Series	56	61	55	59	54	59	50	62	60	57

* Each Figure Represents An Average For 9 Trees.

Zinc Deficiency: In January 1950, one year after planting, four trees were observed with some leaf symptoms which appeared to be typical of zinc deficiency. Three of these received no zinc, copper or manganese. The fourth tree received zinc at 1 pound per 100 gallons.

In February 1951, there were 5 trees with typical zinc deficient leaves. Of these, none received zinc and only one was on the low fertilizer level. In March 1952, 38 trees showed deficiency symptoms. These symptoms were related to the low zinc levels and there was a slight tendency to be related to high copper and manganese. Half of the trees were on the low fertilizer level.

In November 1952, a careful check of leaf symptoms was made. Typical leaves from each tree were selected and then an attempt was made to separate the various patterns and to relate them to treatment. Those that were typical of zinc deficiency appeared related to low zinc and to a lesser extent to high manganese or copper. Twenty-one trees had zinc deficiency symptoms on the high fertilizer level and 16 on the low.

In September 1953, symptoms of zinc deficiency were found on 85 trees. Most of these patterns were found on summer flush foilage. Of the trees involved, 39 were on the low level of fertilization and 46 were on the high. Forty-nine of the trees with symptoms had received no zinc, 26 received zinc at 1 pound of the sulfate per 100 gallons, and 10 received 3 pounds per 100 gallons. There was a tendency for zinc deficiency to be related to increased rates of manganese and copper applications.

In April 1951, and again in May 1953, considerable leaf pattern was present on the spring flush growth. At both times, most of the pattern would ordinarily have been considered as typical of zinc deficiency, but some of the leaves showed green veining similar to iron deficiency, and others were apparently typical of manganese deficiency.

Although in 1953, there was a slight relationship between leaf pattern and the amount of zinc used, trees which had received the heaviest zinc application had almost as much pattern as did those which had never been sprayed with zinc. Other than this tendency there was no relationship to rates of application of zinc, man-

ganese, or copper, but there was more pattern on the high level of fertilization. This association with rate of fertilization was true in both years.

No adequate explanation for these deficiency symptoms is possible at the present time. However, the appearance in 1953 was preceded by almost complete defoliation during the winter months. This problem is discussed further in a paragraph below.

Table 4

Number of Fruit Per Tree When Counted in October 1953.*

Lbs. S04/100 Gal.	ZINC 0	1	3	MANGANESE 0	1	3	COPPER 0	1	3	Average
Low Level of Fertilizer	143	103	134	128	121	131	111	143	125	
	110	138	151	142	126	133	124	128	152	
	166	159	142	160	130	177	153	174	140	
	115	182	155	148	155	149	135	155	162	
Average	134	146	146	145	133	148	131	150	145	142
High Level of Fertilizer	152	156	162	143	166	162	159	155	156	
	182	178	187	197	180	170	169	187	191	
	159	138	144	151	139	151	125	142	174	
	190	167	185	170	186	183	154	174	210	
Average	171	159	170	165	168	167	152	164	183	167
Average of 2 Series	153	153	158	155	151	158	142	157	164	155

* Each Figure Represents An Average For 9 Trees.

Manganese Deficiency: Throughout the 4½ years some leaves have been noted which were apparently typical deficiency. Table 5 shows the relationship of manganese like symptoms to manganese application. In only July 1952 and Sept. 1953 were leaf symptoms typical of manganese related to the rate of application. Thus,

Table 5

Number trees showing symptoms similar to Mn deficiency as related to amount of Mn applied.

	Lbs. of Mn/100 Gals. 0	1	3
March 1952	0	2	3
July 1952	6	4	2
Nov. 1952	11	16	11
May 1953	31	29	27
Sept. 1953*	55	17	3

*Analyses by Dr. C. D. Leonard (C.T. Exp. Sta.) showed that leaves with Mn pattern were Low in Mn.

as noted for zinc above, leaf pattern apparently typical of a given deficiency could not always be related to the rate of application of that material.

Possible Iron Deficiency: As early as April 1950, it was noted that one of the two trees in an area where trash had been burned showed spring growth leaves with a pattern which is now thought to be typical of iron deficiency. This tree had received the equivalent of 1 pound of manganesse sulfate per 100 gallons and no copper or zinc. The other tree in the burned area, but with no leaf symptoms, had received 1 lb. of zinc, no manganese, and 3 pounds of copper. At the present time the pH in this burned area is 7.4, while that around most of the tres is 5.4. This difference was probably even greater at the time of this initial observation.

In almost all of the examinations of leaf symptoms discussed in preceding sections, some leaves with fine green veins were noted, and these were found almost exclusively on young foliage. In February 1953, because of the presence of these symptoms, three of the four 27 tree plots on both levels of fertilization were treated with EDTA* in the form of 2 ounces of the sodium salt of the iron chelate (8% Fe) of EDTA, or the equivalent amount of EDTA as the calcium salt of the calcium chelate, or as the tetra-sodium salt of EDTA. On June 12, the trees were graded according to the severity of the leaf symptoms. In this examination it was found that the two plots which received no EDTA had more severe deficiency symptoms than the other six plots. In fact, there was almost twice as much pattern on the control plots as elsewhere. There was an average of only 3% trees with no pattern in the untreated plots as compared with more than 10 on the treated ones. Although much of the pattern was typical of zinc or manganese deficiency, it was reduced by the use of EDTA. Therefore, it would appear that the leaf patterns which cannot be adequately associated with the use of zinc, manganese, or copper may be related to iron, or at least to some element whose uptake is facilitated by the use of EDTA. Similarly, in the analysis of leaf symptoms in Sept. 1953, zinc deficiency was almost twice as pronounced in the two plots which received no EDTA as elsewhere.

This suggests that the recognition of deficiency based solely on leaf symptoms may be misleading. Thus, in 1951 and 1953 considerable pattern was found on spring flush growth which could not be related to zinc or manganese treatment. In both years these patterns had largely disappeared by late summer, and in 1953, the overall pattern was reduced by the use of EDTA.

So called manganese deficiency symptoms are commonly found on arsenated grapefruit trees and on trees which have suffered severe defoliation. In the former instance these apparently manganese deficient leaves are often preceded by leaves with fine green veins.

During the past two years the authors have found this so-called manganese pattern to be very common on several varieties of citrus on sweet orange root stock. In many places the pattern is present in spite of the fact that manganese has been supplied in spray form during the last two years.

In 1948, the senior author had some leaves analyzed for manganese content* These leaves had symptoms typical of both zinc and manganese deficiency. All were found to have a manganese content of 5-15 ppm. These values were low regardless of the nature of the apparent deficiency. This further suggests that leaf symptoms are brought on by a complex set of circumstances and that often several elements may be below normal levels. It logically follows that sprays of zinc and /or manganese will not always correct such conditions. This is a problem which deserves considerable more study.

Table 6

The Pounds of Metallic Zinc, Manganese, or Copper Actually Applied as Sprays as Compared with the Amount Which Would Have Been Applied in Fertilizer if .25% Based on the Oxide Had Been Used in Each Mixture for Four Years.

	Lbs. of Metal Applied As Spray 1 lb. of S04/100 gals.	3 lbs. of S04/100 gals.	Lbs. of Metal Which Would Have Been Applied at .25% in All Fertilizer Mixtures. High	Low
Zinc	.020	.060	.076	.047
Manganese	.013	.039	.074	.045
Copper	.014	.041	.069	.042

APPLICATION OF RESULTS TO YOUNG GROVES: The results reported here suggest that young trees

* Ethylene Diamine Tetra-acetic Acid.

* Analyzed by A. E. Willson, formerly Asst. Biochemist, Citrus Expt. Sta.

need very little zinc, manganese, or copper during the first four years after planting. However, there is no evidence to show that larger amounts used were in any way harmful during these early years. It has been suggested (1) that a desirable level of copper in grove soils is about 50 pounds per acre. No such figures are available for manganese, and information on zinc is still further lacking and confused. It appears logical, however, to slowly build up reserves of these materials in the tree and in the soil.

Table 6 shows the actual amount of zinc, manganese, or copper which was applied in spray form during the first four years. This is compared with the amount of the metal which would have been applied if each application of fertilizer had included 0.25 of a unit expressed as the oxide. Had the material been applied in the fertilizer the low fertilization rate would have been fairly comparable to the 3 lbs./100 gallons level. The 1 lb./100 gallons rate appeared to be reasonably adequate and this represents much lower amounts that would have been applied in the fertilizer.

These experiments have no data on the adequacy of soil applications and recommendations along this line must be tentative and subject to revision. At the present time the authors are suggesting that manganese and copper be included in all young tree fertilizer mixtures at .25 or .30 unit expressed as the oxide. These are arbitrary figures, but by following this procedure, at the end of 10 years, at least 25 pounds of metallic copper or manganese will have been applied per acre. If an occasional nutritional spray is included, the amount will increase. On the basis of field experience these levels are probably adequate during that period.

It is possible that soil applications should be supplemented by at least one spray during the first year or two. Whether or not young groves can be maintained with soil applications of zinc has never been fully explored, and zinc sprays remain in order until more information is available. On the basis of these experiments there seems little justification for the application of more than one nutritional spray per year at rates equivalent to 3 pounds of zinc, manganese, or copper sulfate. Reduction in the number of nutritional sprays will probably be beneficial in terms of insect control.

Rates of fertilizer application yield some perinent information. It would appear that the higher level applied in these experiments may ultimately be justified in terms of yield.

Summary And Conclusions

1. Valencia trees on rough lemon root stock were set out on virgin soil near Lake Placid in the spring of 1949. Since that time, copper, zinc, and manganese have been applied as sprays at rates of 0, 1, and 3 pounds of the sulfate of the metallic equivalent of a neutral material per 100 gallons. Single tree treatments were used with 4 replicates on each of two fertilizer levels.

2. At the end of four years, trunk diameter was not influenced by the amount of zinc or manganese applied. There appeared to be increased diameters as compared with the low level of application.

3. The number of fruit produced per tree in the 1952-53 and the 1953-54 seasons was not influenced by the rates of zinc or manganese used. Where no copper had been applied, some fruit was ammoniated and there were less fruits per tree. High fertilizer levels increased the number of fruits.

4. Some zinc deficiency symptoms have been present on foliage since the first year, but no really deleterious results on yield or growth have been noted as yet.

5. Several leaf patterns have been present which cannot be correlated with the use of zinc, manganese, or copper. An application of EDTA reduced some of these symptoms.

6. It is suggested that young trees require no more than one nutritional spray per year at the equivalent rate of 3 pounds of the sulfate of zinc, or copper. It is further suggested that manganese and copper be included at about .25 of a unit expressed as the oxide in all fertilizer mixtures applied on young trees for the first 7-10 years. As much fertilizer as was used at the high fertilization level in this experiment will probably be justified in young groves.

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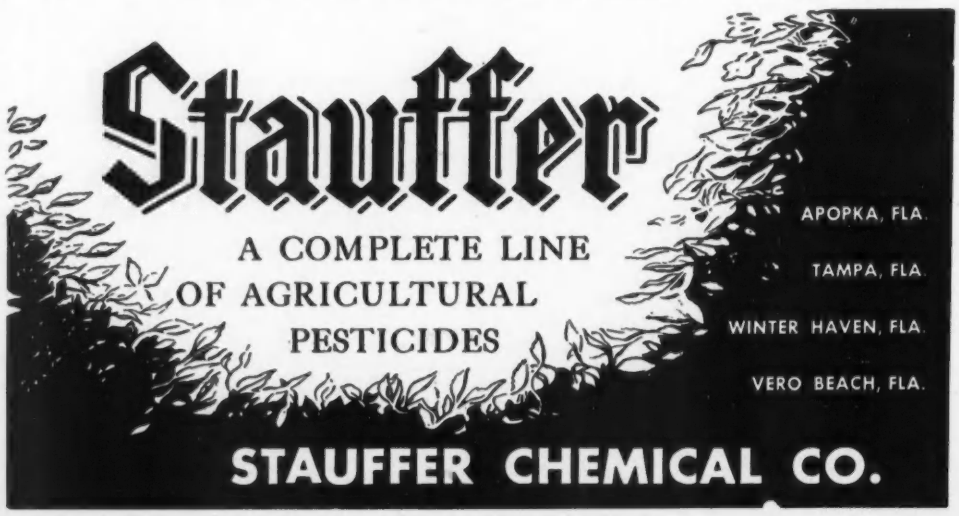
Ladybeetles are generally considered beneficial insects, the Mexican bean beetle being the principal destructive member of the family.

Tests at the Florida Agricultural Experiment Station have shown that waste beef fat makes a valuable ingredient for swine feed.



THE NECESSITY OF QUALITY FRUIT IN THE TERMINAL MARKETS

(Continued From Page Eight)

purchases of fresh in addition to frozen or canned items. Shoppers are not always completely sold on appearance and sometimes final selection is made by feeling the fruit for weight, sponginess, and skin texture. These factors must not be overlooked.

Dealer Service

The very minute fresh fruit reaches the market, dealer service work must begin. The first target in terminals are the auction markets where the field men keep in close contact with receivers, buyers and brokers. Close cooperation is needed at this point to lay the ground work for informative retail merchandising. These receivers can assist us with valuable comments on market conditions, supplies of competing fruits, as well as providing information on daily prices. In turn our dealer service men can supply them with information on retail conditions. This daily contact acts as a clearing house enabling information to be passed in both directions. Buyers and brokers both play an important part when they cooperate in dealer service operations and help gain wide distribution for point of sale material on their products. Wholesalers operate on a similar basis as buyers, and in addition allot wall space for displaying material to retailers. Most of our larger cities which contain several wholesale areas, usually supply the smaller chains and independent retailers. These wholesalers operate on a limited basis and lack the staff to give individual attention to the merchandising of their products through their individual retail stores. The small wholesaler plays an important part, for when combined, they are responsible for the movement of a large volume of citrus.

Chain Stores Important

Chains today are our most important contact as they not only handle a large volume but also control most of the stores where Mrs. Consumer does her marketing. Since it is impossible to individually contact all their outlets, close cooperation is needed through headquarters. Here is where advertising tie-ins are obtained, mass distribution of display material takes place and special promotions are arranged. Chains are a self-service operation, generally speaking, and the number of sales clerks is limited. Citrus now must be its own salesman and, therefore, must tell the whole story. Quality at this level is of utmost importance. It

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The sure, easy and economical way to apply soluble magnesium is with *Sul-Po-Mag* in mixed fertilizers. Your local dealer probably handles a fertilizer which contains *Sul-Po-Mag*. Leading manufacturers of quality plant foods use *Sul-Po-Mag* regularly in most of their grades because it is the most practical and effective means of supplying *sulfate of potash* and *sulfate of magnesium*, both in soluble form and immediately available to growing crops.

So . . . to be sure that you get a fertilizer containing the *fourth element*, look for it *in* the bag and *on* the bag: Nitrogen—Phosphate—Potash—*Magnesium*.

Potash Division
INTERNATIONAL MINERALS & CHEMICAL CORPORATION
General Offices: 20 North Wacker Drive, Chicago 6

eventually may determine whether or not the sale is made or lost.

Through the chain store headquarters, permission is granted for our dealer service staff to make personal store calls where material actually can be installed, mass displays erected and demonstrations conducted. These stores can set examples for other chains to follow. The tremendous sales results obtained are often used as a tool when soliciting other major outlets.

In addition to major chains, one must not overlook the importance of drug fountains, hotels, restaurants and institutions which are vital for mass consumption of citrus. These accounts must be solicited and familiarized with dealer service programs. Point of sale material again plays an important part along with recipes, menus, books and pamplets. Individual contacts can also be made on these outlets to set up special promotions, again with the aim of demonstrating the importance of such installations in increasing sales. Dealer service activities have been in operation for a long time, and through the years have become more and more valuable in the marketing of any commodity. Today retailers depend on service organizations to tie-in individual items with both national and local advertising. They depend on this service not only for promoting individual brands but also to increase sales on commodity items, such as Florida citrus. During the years, it has shown chains and independents the necessity for mass displaying of point of sale material and recently the importance of demonstration activities. Obviously, it is a lot easier to render this service on quality merchandise, especially on demonstrations where outer quality is being viewed and inner quality sampled.

Quality Must Sustain Advertising

Many advertising programs are not completely successful unless they are properly merchandized to the trade. Companies and organizations spending millions of dollars on advertising do only a partial job when their product is not properly merchandized. Shoppers see and hear this advertising, both nationally and locally, but do not associate it with the product unless it is well merchandized in the stores at the point of purchase. Here advertising and merchandising must be closely coordinated if the maximum results are to be obtained. Demonstrations and mass displaying are tremendously important and can often be the sole reason for the increasing sales of any item.

In conclusion, all the best planned advertising and merchandising efforts will fail if quality citrus is not displayed at the right time, at the right place and in the right manner.

There truly is no magic in advertising or merchandising which can overcome the absence of quality.

CORRECTION

Attention is called to an exasperating error which occurred in the article by Dr. Theodore J. Grant, entitled "Aids in the Detection of Tristeza in Florida Citrus", which appeared in the December issue of this magazine. In making up the forms the matter in pages 14 and 16 was reversed. The article should have run over from page 13 to page 14. Instead it was carried to page 16, making a deplorable interruption in continuity. The error is regretted by the management of this publication.

CHARLOTTE FARMERS FERTILIZE DAMAGED GRASS

Charlotte County farmers fertilized more than 5,000 acres of Pangola grass during the past month to stimulate growth for winter grazing, according to County Agent N. H. McQueen.

NEW YOUTH BUILDING WILL BE READY FOR 1954 PINELLAS FAIR

Two units of a new Youth Building on the fair grounds at Largo will be ready for the 1954 Pinellas County Fair, according to County Agent J. H. Logan.

Plans for the building, in which the work of rural boys and girls will be exhibited and demonstrated, were made several weeks ago by the agricultural committee of the Pinellas County Board of Commissioners, interested farmers, and Mr. Logan.

OBSERVATIONS ON CITRUS BLIGHT . . .

(Continued From Page Seven)

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Mild Form Of Tristeza Said Found In Texas

HARRY FOEHNER, EDITOR
TEXAS FARMING AND
CITRICULTURE

A mild form of tristeza has been found in Meyer lemons in Texas but the industry has not fallen into a dead faint at the news because the evidence indicates the disease has been present in this variety of lemons for over 20 years apparently without having spread to grapefruit and oranges.

A virulent form of the disease has about destroyed the citrus industry in a number of South American countries and has caused considerable damage in California while less damaging forms have been found now in Florida, Louisiana and Texas.

The Texas industry is preparing to "live with" the disease as Florida is doing but discovery of the virus in lemons no doubt will stimulate precautions against introduction of the more serious forms.

For a long time Texas growers thought that they had two or more strains of Meyer lemons because some wound up spindly while others did well but it now appears the difference was that some were infected with the tristeza virus while others were not. To complicate matters even more, infected lemons on their own roots appeared healthy and even those budded to sour orange rootstock, a highly susceptible understock were healthy where the scion rooted as a result of banking trees for the winter.

Ed Olson of the U. S. D. A. citrus rootstock project at the Valley Experiment Station at Weslaco told how the virus was discovered. Buds from spindly lemon trees were grafted to West Indian Limes which show the symptoms of tristeza more readily than any other citrus. Within a matter of weeks the limes developed the symptoms, vein clearing and pitting under the bark. The tests were duplicated with the same results.

It is believed that the virus is present in individual trees scattered all over the principal Texas citrus area but not in all Meyer lemons. Grapefruit and orange trees near infected lemon trees were examined but appeared healthy but no tests have been made as yet.

Experiment station technicians were at a loss to account for the lack of transmission to other trees except that it is a mild strain of tristeza and that the vectors are not as efficient as the aphids present in South America and California. Then again the aphids may not be able to pick up the virus due to proteins or leaf structure but the technicians admitted that they were only guessing.

Bailey Sleeth of the experiment station said that although the situation is not alarming that the area still faces the possibility of a virulent form being introduced. The mild form may have been the effect of immunizing trees against the virulent form, a situation that developed in South America.

The experiment station is setting up a practical program to meet the situation. For one thing a survey will be made to determine whether the virus is actually confined to the Meyer lemon, what the effect of the virus is on grapefruit budded to sour orange rootstock which is commonly used here, what insects if any transmit it here. The station will work with the tree certification program to see whether any registered trees from which budwood is taken have the disease. However, such trees generally were the best and most vigorous in the groves where they were selected to provide budwood free from psorosis or scaly bark.

The industry would do well to do part of its replanting on Cleopatra mandarin rootstock which is known to be resistant to tristeza, says W. C. Cooper of the U. S. D. A. citrus rootstock project in Texas. If rough lemon roots had not developed such a bad reputation here, perhaps because early plantings on this rootstock were in heavy soils whereas it does best on sandy land, Dr. Cooper believes that it might be more widely considered by Texas growers. It is almost

(Continued On Page Eighteen)

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Reports Of Our Field Men . . .

HIGHLANDS AND POLK COUNTIES

J. T. Griffiths and J. K. Enzor, Jr.

High rainfall has continued through the middle of December in the Polk County area. This has resulted in wet spots in numerous groves, but the full extent of the water damage will not be realized until dry weather sets in next spring. Where water injury is suspected, growers should be ready to irrigate during the dry period which is probably ahead of us in the spring.

Fall fertilizer has been applied in most groves and there is concern on the part of some growers concerning the adverse effects of the heavy rains which have been experienced. These rains have been capable of leaching considerable amounts of fertilizer materials. However, at the same time they have made these materials available to the trees. It is only fair to consider that the general good tree condition seen throughout this area is partially attributed to the rains which we have had. The best answer to these growers' worries is to carefully examine the grove in question and to see if it actually shows any hunger symptoms. There are young groves which are pale in color at the present time. In most cases this is the result of insufficient total fertilizer from September to the present time, apparently they required additional amounts over the normal rates applied in many places.

Purple mites have caused relatively severe injury in some individual groves. This has not been a general situation, in fact purple mite populations are at a reasonably low level in most places. Rust mites are common on the foliage in many groves and there have been days in the past month when they were found almost exclusively on the top side of the leaves. The cause for this is not known.

Greasy spot is dropping leaves in some groves. We have been able to find a definite relationship in the formation of greasy spot and the use of parathion-sulfur as a replacement for oil as the summer scalicide. There is no adequate explanation for this at the present time. We do not feel that this is any reason for a reduction in the use of parathion, but rather that growers should be extremely careful to look for rust mite infestations following the use of summer parathion-sulfur sprays. The records show that commonly rust mites return more rapidly following parathion-sulfur than following oil. There is no easy answer for this rather involved problem at the present time. We certainly have no reason to consider any ideas leading to a reduction in the use of parathion sprays.

Tangerines have had a relatively heavy, but normal leaf drop during early December. It is possible that this has been accentuated by greasy spot, rust mites, or purple mites in some instances. The falling leaves are characterized by being old and often having a yellow midrib.

PASCO AND HILLSBOROUGH COUNTIES

E. A. McCartney

The Fall application of fertilizer is finished and we are getting ready for the early spring top dresser. The fruit has matured early this season on account of the favorable growing conditions.

Just at this time there is a lot of uncertainty about the immediate future of what is going to happen to the growers if the can manufacturers do not get back into production soon.

Citrus fruit is in fine condition, grapefruit is running to small sizes, and if the can situation gets straightened out the grower should be in good shape.

SOUTHWEST FLORIDA

Eaves Allison

Since the last writing of this report the weather has slipped us another fish. Instead of frost and cold being the hazards in this late fall crop it all seems to be water. A heavy 2½" to 4" rain early in December slapped the big hat on the tomato deal, blacking out what looked like a profit to most growers, even though slim.

Other crops suffered in like manner and recovery at this late day is slow. Citrus is in good quality, with sizes seeming to run small in grapefruit, on the average, for this section.

At this time no predictions are in order, as anything can happen. Crops with that good Lyons Fertilizer under them still have a chance to come out. We have seen worse conditions—we just don't remember when!

WEST CENTRAL FLORIDA

J. E. Mickler

To the citrus growers at least, the weather, for once, was too nice. Continued warm weather had the promise of giving the trees the wrong impression of seasons. However, summer ended quite suddenly for all, and we now have as close to cold weather as most would want.

With the combination of good weather conditions, good fertilizer practices, and little insect infestations, the groves in this section are looking extra good at this time.

NORTH CENTRAL FLORIDA

V. E. Bourland

We have been having beautiful weather, but extra heavy rains which has flooded the flat land groves again. At the present time it is windy and cool. Fruit is moving slowly on account of canning plants only taking packing house eliminations which is causing the growers to get worried as some of their fruit is beginning to drop. All high land groves are looking good, but most of them have been worked and fertilized.

SOUTH POLK, HIGHLANDS, HARDEE AND DESOTO COUNTIES

C. R. Wingfield

A severe cold wave moved into the State in mid-December bringing with it heavy frost across the State, reaching deep into the muck regions of Okeechobee Lake. Damage to vegetable crops were very heavy in these areas where frost formed. The lowest temperatures were on the morning of the 18th which brought more damage to vegetable areas.

Most growers had applied their fall applications by Dec. 15th and trees were in splendid condition. In some groves rains have kept ground rather wet and these groves should be given careful attention as to cultivating.

XUM

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Uncle Bill Says;

They is some folks who figger that Christmas is just another day on the calendar . . . but fer our money we figger it would be a good thing if they was at least one Christmas day every month of the year, 'er even better if we all felt the same way towards our family, our friends and acquaintances every day in the year like most of us do at Christmas time.

Us folks who make our living growin' fruit and vegetables in Florida has our difficulties and problems jist like the lawyer, the preacher and the business man, but by 'n large we have a sneakin' suspicion that us growers is pretty well off . . . even if we count those bad years which come along every now and then.

'Course we have to fight with insects and pests, 'n sometimes it rains too much or too little . . . while on rare occasions the weather man fergits where he is and gives us a touch of cold that don't belong in Florida . . . but when we stop to consider the return we get on our investment most of us is doin' better than if we was in some other business not affected by sich things as we've jist mentioned.

On the whole we'd say that Nature was pretty good to us . . . and if we take full advantage of what Nature does and then add what we're learnin' all the time about how to help our climate, our soil and our sunshine do, we turn out a heap of the best fruit and vegetables to be found anywhere.

Personally, we're plumb glad that we live in Florida and that we're in the agricultural business . . . and we know a lot of other fellers who feel the same way about the matter.

So, if you ever git grumpy and wonder why the heck you ever got into this business jist take time out to find some guy in some other business and git him to tell you about his troubles.

And may this be the Happiest and most Prosperous New Year you've ever had.

Citrus Exposition To Be Held In Winter Haven, February 15-20

A comprehensive exhibit, designed to show the various diseases and pests that are found in Florida Citrus groves, with graphic demonstrations of the methods of detection and identification, will be a feature of the 1954 Florida Citrus Exposition in Winter Haven Feb. 15-20, Jack M. Berry, president of the show said recently.

The Florida State Plant Board, active for years in the detection and eradication of agricultural and horticultural diseases, will assemble and sponsor the exhibit.

The new certified disease-free nursery stock program being conducted by the plant board will be explained in visual and audio presentations, Berry said.

"We have to recognize the fact that Florida citrus, like any other agricultural commodity, has its threatening diseases and pests which are constantly being fought by growers with the help of the state plant board and we feel it is only proper for the Florida Citrus Exposition to provide the facilities for this display which will be the first of its kind ever shown in the state before a mass audience" Berry said.

JACK M. BERRY, prominent Winter Haven grower and citrus broker, is the new president of the Florida Citrus Exposition. Berry was secretary of the Exposition for more than a year prior to being named to his new position. The 1954 presentation of the nation's only industry sponsored citrus show is scheduled for Feb. 15-20 at Winter Haven.

The Exposition has designated Thursday, Feb. 18, as "Fresh Fruit Day" and will make an effort to get growers to attend the show on that day with the State Plant Board exhibit arranging a special program and possibly brief talks on the disease problem in Florida citrus.

MILD FORM OF TRISTEZA SAID FOUND IN TEXAS

(Continued From Page Fifteen)

as salt tolerant as Cleo and some trees now growing here have more and larger fruit than others growing on other stocks. Its cold resistance is less in small trees at least. It also is more susceptible to root rot. Cleo on the other hand is subject to iron induced chlorosis in calcarious soils but these are the soils in which rough lemon likely would do well so the variety of resistant rootstock used may depend on the locality where the trees are to be planted.

Classified Ads

SUPERIOR CITRUS TREES — Now available on Rough Lemon, Sour Orange, Sweet Orange, and Cleo Rootstocks. Prices $1.10 up, depending on the size and number ordered. Also Seedlings for lining out of all varieties. Write for "Tips To Growers."
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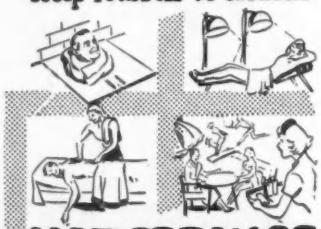

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